

Paul

- 5

- 10

- 15

- 20

- 25

- 30

- providing at least one detector downstream of the first position; and

Sub
B2

detecting a change in beam intensity downstream of the first position with the detector.

8. The method of claim 1, wherein the step of detecting an intensity profile comprises:
moving a detector in a direction transverse to the beam direction; and
detecting a change in beam intensity that corresponds to the adjusted intensity profile.

9. The method of claim 1, wherein the step of determining a direction or parallelism comprises:
identifying a first position where an adjusted intensity profile that caused the detected minimum intensity profile was created;
identifying a second position where a minimum intensity profile is detected; and
determining a direction or parallelism of the beam based on the first and second positions relative to the reference direction.

10. The method of claim 1, further comprising:
forming a second adjusted intensity profile from at least another portion of the beam at a second position;
detecting a second intensity profile of at least another portion of the beam downstream of the second position; and
determining a direction or parallelism of the beam based on the positions of the detected intensity profiles relative to the positions of the first and second adjusted intensity profiles.

11. A method for determining a direction or parallelism of an ion beam, comprising:
forming an ion beam;
blocking a portion of the beam with a beam modifier;
identifying a position where a shadow is formed by the beam modifier; and
determining a direction or parallelism of the ion beam based on the position of the shadow relative to the position of the beam modifier.

16. The apparatus of claim 15, wherein the controller determines a direction or parallelism based on the positions of at least one detector and the beam modifier relative to a reference direction at a point of minimum detected beam intensity.

5 17. The apparatus of claim 15, wherein the beam modifier includes a drive system that moves the beam modifier transverse to a path of the charged particle beam.

18. The apparatus of claim 15, wherein the beam modifier outputs a signal that is used to determine a measure of uniformity of the charged particle beam.

10

19. The apparatus of claim 18, wherein two detectors detect an intensity profile of two respective portions of the charged particle beam, and the beam modifier is a Faraday detector moved in a direction transverse to the charged particle beam.

15

20. The apparatus of claim 19, wherein the beam modifier is moved in a direction transverse to the beam direction along a workpiece plane.

Sub 24
20 21. An ion beam implantation apparatus comprising:
a charged particle beam generator that generates a charged particle beam; and
the apparatus of claim 15.

25

22. The apparatus of claim 21, wherein the charged particle beam generator scans the charged particle beam in a direction along at least a portion of a workpiece plane.